Observations....There is not sufficient novelty in any of the above processes, to render this patent of any apparent use to its owner, except that of having the name of selling a patent article.

Account of the method proposed by Colonel Caulfield Lennox, of constructing, and putting in its place an Iron Tunnel under the River Thames.
Phil. Mag. xxxvi. 34.

Colonel Lennox proposes that the Tunnel shall be cast in portions of its length of ten feet each, which in the figure annexed to his paper, resembles an arched gate-way, eighteen feet broad, twelve feet high at the sides, and ten feet long, with a convex top rising two feet in the middle. They are to be made of cast iron, four inches thick at the bottom and sides, and three at the top, with double flanches inside and outside, one foot broad, and four inches thick; each frame the colonel calculates, will weigh forty tons.

Those frames or portions, are to be united to each other, by screws four inches diameter, and nuts of a proportional size; and to have sheet lead half an inch thick put between the flanches, or the joints secured with the cement employed by steam engine builders. Cramps are also mentioned for connecting the two adjoining flanches at bottom, but no farther description of them is given but that they are each to be twelve inches broad, six inches thick, and two feet high.

Tubes of eight inches bore, with openings to receive leakage water, are to be cast in the angles at the bottoms of the frames, by which the whole is to be kept dry, with a properly constructed pump.

The colonel proposes that eighty of these frames shall be screwed together, with half inch lead between the flanches, with their two extremities close stopped with strong oak plank, on the side of the river rather below the level of low water, in a situation where the tide may have free access; and that (a level bed having been previously excavated for this tunnel, across the bottom of the river, sixteen feet deep, and from 60 to 80 feet wide) the whole be floated to the required situation, at spring tide, and sunk in its proper place, either by additional weights applied, or by admitting a certain quantity of water into it, and asserts that, in case of any irregularity in its descent, or unevenness in the bed prepared to receive it, *it will again become buoyant by removing the additional weights*, or by pumping out the water by pumps previously secured in each end frame.

Calculation of the weight of this tunnel in round numbers.

	Cubic Feet		Tons.
Cast iron, ...	20.020	about	4270
Lead, ...	566	. . . . .	178
Oak, ...	200	. . . . .	5
			4.453
Water displaced,	1.850.000 cubic feet		5.163
This tunnel will require to sink it more than			709
Exclusive of the convexity at top, estimated at			60
			769

The following is the manner proposed of sinking this machine by the additional weights.

Two short ropes with loops at each end, are to be passed over each frame, and slightly secured in their places; and when the machine is floated to its destined situation (which should be an hour before low water at the lowest tide) anchors and cables being in readiness to secure it in its place, then a number of boats (suppose 160) shall attend half on one side, and half on the other, each with five tons of ballast conveniently disposed so as immediately to hook on to the ends of the short ropes before mentioned, in such a manner that one end of the tunnel shall not sink before the other, but both exactly together. These weights may be so regulated as occasion may require, should there appear any irregularity in its descent; and when it is placed as desired and the water admitted to fill it, they may be removed altogether. The whole of this operation might be effected in two hours, that preceding, and that following ebb tide, if every previous arrangement was properly made. The machine consisting of 80 frames of the length mentioned, would extend

800 feet, which the colonel supposes to be the breadth of that part of the bottom of the river, which could conveniently be made level.

When this part of the tunnel was fixed in its place, the ends might be finished as on dry land, by piling off the tide at low water mark;—and they might either be formed by a continuation of the same cast iron frames, or by arches of masonry or brick work, as might be judged best. After this there would only remain to open the communication with the middle part, by removing the oak planking at each end, and pumping out the water; when by laying a sufficient quantity of ballast, so as to form a road way, clear above the lower flanches, and restoring the banks to their former state, the tunnel would be immediately ready for use.

In the execution of this project a situation should be chosen close to low water mark of nearly 300 yards in length, where it would be necessary to lay down blocks of sufficient strength to support so great a weight; and upon which the whole 80 frames may be screwed together. Its level should at least be fifteen feet, below that of the spring tides, to ensure the floating of the machine when completed.

The materials of the tunnel, Colonel Lenox calculates to cost about £44,000, and allowing fifty per cent additional for all other charges incurred in its execution, he does not conceive that the expense would exceed the sum of £66,000

If it should be desired to enlarge the tunnel so as to afford a foot path in addition to the space allowed for two carriages to pass, the colonel conceives it may safely be done by giving it six more feet in width, making altogether twenty-four feet between the interior flanches, and in order to afford it still greater strength, he would in this case omit the interior lateral flanches, and in their place, put plates of cast iron, three or four inches thick the full height of the sides, and extending from the middle of one frame to that of the next, to be fastened, by a number of the same kind of screws before mentioned, to the two adjoining frames, with sheet lead between them and the frames completely covering the joint inside. This would give the tunnel great additional strength, besides that it would leave nearly a foot more of free space inside. The increase of expense by this alteration would not, the colonel thinks, much exceed twelve or fifteen thousand pounds, in addition to the sum before stated.

In order to obviate the objection which might arise from the difficulty of transporting frames of the weight of forty tons, from the foundry to the river, the colonel states that they may be cast in separate pieces (if the other method should appear impracticable) with flanches to join them at the corners. In this case the joinings of the different parts are to be so disposed that no two of the transverse joinings shall coincide; which would give additional strength to the whole, as every joint may thus be supported with three solid pieces, at that place where it occurs.

The colonel thinks the chief difficulty in this project would arise in the excavation of the bed for the tunnel at the bottom of the river of the depth required; but this, he states, might be obviated by chusing another situation for it, where the present depth of the river would be sufficient, to allow free space for vessels to pass over it, when sunk at low water.

Observations....This plan for making a tunnel across the Thames would probably be found as easy of execution as any yet published; and would have the advantage over that first proposed by the company for constructing a tunnel across the river at Redriff, of saving full twenty feet in the descent, which would much facilitate the passage of carriages. There are however some difficulties in the execution of the business, which do not seem to have occurred to Colonel Lenox, one of which is, that as soon as the iron tunnel was lowered down, it would be almost impossible to move it, after it had settled on the bottom (in case it should be desired to do so from its having assumed a wrong position, either in its longitudinal or transverse direction) for instead of *becoming buoyant again on removing the additional weights* laid on to sink it, in all probability it would require

a force to raise it equal to the weight of the superincumbent water added to that of the pressure of the atmosphere. Because when it had settled in mud so tenacious as that of the Thames, the water once forced out from under it would in a little time be so completely excluded, as to prevent the pressure acting at all beneath it so as to give it any tendency to rise, and it would be then held down by the weight of the water above it, and by that of the atmosphere, in the same way as the two brass hemispheres, are held together by the latter pressure alone in the well known pneumatic experiment. Perhaps some method might be devised of preventing this accident, but no obvious means appear at present of doing so effectually. It will be best therefore to be extremely cautious in preparing the bed for the iron tunnel, and in sinking it very slowly and carefully into its proper situation, if the plan should receive that trial it so well merits

On a sandy or stony bottom, a caution of a precisely opposite nature would be necessary, for on such a bottom the tunnel would have a tendency to rise, when the water was pumped out of it; this however could be easily prevented by having the top formed with ledges so as to retain stones or earth thrown on it to keep it down, or by having projecting cases attached to the sides for the same purpose.

Of the plans proposed by Colonel Lenox for constructing the tunnel, the last mentioned by him seems the best, on account of its greater strength, the greater portability of the parts, and its not having the obstruction of the large internal flanches, which would occupy no less than an eighth of the internal breadth, reckoning the eighteen feet mentioned for the breadth to be outside measure. The great wrought iron screws, proposed for fastening the frames together are very objectionable on account of the speedy decay to which wrought iron is liable in or near salt water; large copper rivets would be much preferable, and would cost little if any thing more, on account of them requiring so much less workmanship in their fabrication The idea of constructing and floating off, and fixing in its place so large a portion of the tunnel as 800 feet seems a very grand one, and indicates a comprehensive and enlarged mind in its ingenious suggester, and does him much credit.

There does not seem to be any reason for confining the shape of the tunnel to a perfect right line, besides its being applicable to the part of the river for which it is proposed; where the bottom of a river was curved, the tunnel for it might be curved likewise so as to fit it, which would occasion much less cost in excavating a proper bed for it. in this case a water-tight pipe must be carried from the pump to the center of the tunnel, to free it from water. A straight tunnel would perhaps be best posited so as to be a little lower at one end than the other, in order to give the leakage water a fall to the pump, and the bed of the Thames at the place intended for the tunnel, has just such a slope towards the Rediff side, according to the section of it published by the tunnel company

Colonel Lennox omitted to state in his directions for placing the iron tunnel, that it should be furnished with a pipe from its top, to let the air escape, as otherwise it would be impossible to let the water into it as he proposes. This pipe should have a stop cock to regulate the passage of the air; by the proper management of which, the descent of the tunnel to its own depth might be made as gradual as could be desired (if the mode of sinking it by admitting the water into it was adopted) but below this depth the descent would require to be regulated by hawsers lowered by degrees from lighters stationed above it at regular intervals, as otherwise, after it got beneath the water, it would be precipitated to the bottom with an accelerated velocity, which might either cause it to burst, or to be fixed unalterably in a position so unfavourable as to render it entirely unserviceable.

Hyperoxymuriatic acid shown to be muriatic acid deprived of Hydrogen, by Mr. Davy.

Phil. Mag. xxxvi. 70.

A paper on muriatic acid was read by Mr. Davy, before the royal so-